SOME RARE AND THREATENED BEES RECORDED FROM SALISBURY PLAIN, WILTSHIRE

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INTRODUCTION

Salisbury Plain is located in south Wiltshire, extending westwards from the county's eastern border to Westbury and Warminster, and from the Vale of Pewsey 10 miles south to the vicinity of Amesbury. Except for a few small villages, the western half of the region is sparsely inhabited, the main centres of population being the army garrisons. The Plain is about the same size as the Isle of Wight, with vast tracts of countryside designated as the Salisbury Plain Training Area (S.P.T.A.), the property of the Ministry of Defence (M.o.D.), and used primarily as artillery ranges and for training personnel. Much of the area consists of chalk grassland, with scrub and isolated plantations. The S.P.T.A. encompasses the largest remaining piece of semi-natural chalk grassland in Europe (37,651 ha.) (McOmish & Field, 1993). Some of the grassland is mown annually for hay in late June and early July, an activity which unfortunately coincides with the peak flight period of several of the rarer bees in these areas, as many pollen and nectar sources are removed.

Possibly because of its M.o.D. administration (permits are required for access to the ranges), the region has been largely neglected by entomologists. Our recent survey has shown that Salisbury Plain has a very rich aculeate fauna (especially comprising those species characteristic of calcareous grassland), and includes a number of nationally rare or threatened species. The latter includes the bees *Melitta dimidiata* Mor. and *Nomada armata* H.-S., both of which are accorded RDB1 status (i.e. they are categorized as nationally endangered species in the insect Red Data Book (Else & Spooner, 1987) and *A review of the scarce and threatened bees, wasps and ants of Great Britain* (Falk, 1991). In Britain *M. dimidiata* is known only from a few grassland sites in Wiltshire.

In the period 1983–85 a thriving population of *M. dimidiata* was found by G. R. Else and M. Edwards on chalk grassland near Easton Royal in the Vale of Pewsey. A subsequent search in this site on 25.vi.1989 by both authors revealed only a single male. None was encountered on further visits by us, the most recent in June 1993. The bee had been found here first by K. M. Guichard on the 29.vii.1972 (Guichard, 1973). This site is a small, isolated cutting, consisting of a footpath and an adjacent steep grassy slope; the area is surrounded mainly by 'improved' sheep pasture (a euphemism for artificially fertilized grassland which is deficient in most plants characteristic of chalk downland). The population crash seems to have been due to rabbits which had eaten many of the sainfoin (*Onobrychis viciifolia* Scop.) plants on which this bee solely relies for both pollen and nectar. Encouragingly this plant had fully recovered to its former abundance by June 1993.

The depressing decline of this bee prompted us, in 1991, to undertake a survey of the four sites (all on Salisbury Plain) where the species had also been found in the past, and to investigate other grassland sites on the Plain where sainfoin was well established in the hope of finding further populations of *M. dimidiata*. As a result, over the three seasons 1991–93, a most encouraging picture of the fortunes of this

bee emerged. Indeed the species is proving to be well established over a wide area of Salisbury Plain, and here it is clearly not endangered. The survey also revealed the presence of other scarce bees on Salisbury Plain and should provide a basis on which conservation measures for these can be implemented if considered appropriate in the future. Preliminary results of some of the species encountered are presented below as an annotated list. We plan to continue with this survey in future seasons.

Scarce bees recorded from the Salisbury Plain, 1949–1993

Hylaeus cornutus Curt. (Colletinae). This is a rare species, restricted to the south-central and south-eastern counties of England, the range extending from Kent to Dorset, northwards to Wiltshire, Berkshire, Oxfordshire, Northamptonshire, Cambridgeshire, Suffolk and Norfolk (Else, in prep.). It has been reported from open, broad-leaved woodland, fenland and chalk grassland. A male of this bee was collected from an oxeye daisy (*Leucanthemum vulgare* Lam.) flower on Tilshead Down by G. M. Spooner on the 14.vi.1974. A female was collected from scentless mayweed (*Tripleurospermum inodorum* Schultz Bip.) blossom on Figheldean Down (between Netheravon and North Tidworth) on 22.vii.1993 by S. P. M. R., and two other females on wild carrot (*Daucus carota* L.) inflorescences by G. R. E. on Great Cheverell Hill (a chalk downland reserve of the Wiltshire Wildlife Trust near West Lavington) on 21.viii.1993. These records seem to be the only ones known from the county. The national flight period of this single-brooded species extends from June to August.

Andrena hattorfiana (F.) (Andreninae). This is one of the largest of British *Andrena* species and is widely distributed but very local in southern Britain. Its range extends from east Kent to west Cornwall, northwards to Wiltshire, Oxfordshire, Surrey, Essex, Northamptonshire, Cambridgeshire, Suffolk and Norfolk; there are also old records from South and West Glamorgan (Else, in prep.). Until recently there were very few records from Wiltshire. C. H. Andrewes collected single specimens of *A. hattorfiana* in or near Salisbury on 11.vii.1947 and 31.vii.1948, and from his garden at Coombe Bissett (west of Salisbury) on 25.vii.1974. One of us (G. R. E.) found many specimens near Easton Royal from 1983 to 1985. Several were also recorded by G. R. Else and M. Edwards on the roadside at Cow Down, north of North Tidworth, on 7.vii.1985. During the course of our survey we found the bee on seven sites on Salisbury Plain. These are summarized (from west to east) as follows: Great Cheverell Hill, Tilshead (several places), near the Bustard vedette, Bulford, Figheldean Down (including the roadside), Weather Hill (south of Everleigh) and Cow Down. Both sexes are almost exclusively associated with the flowers of field scabious (*Knautia arvensis* (L.)), a plant characteristic of the grasslands of Salisbury Plain. We have occasionally found individuals visiting small scabious (*Scabiosa columbaria* L.) (including a female collecting pollen) and greater knapweed (*Centaurea scabiosa* L.) flowers. Nest burrows of the bee have been found in wheel ruts along a track near Tilshead (these included a small, loose aggregation of five burrows) and another in a soil exposure on the edge of a field. The rarer red-marked form of the female is not uncommon on the Plain, perhaps comprising 30% of the female population in some sites. Nationally, the flight period is from late June to mid August.

A. marginata F. Males of this species were observed visiting the flowers of small scabious on Figheldean Down on the 14.vii.1993 (apparently the first Wiltshire records of this bee). Females were found here on 19 and 22.vii.1993. Several females were also encountered on roadside flowers of the same species at Weather Hill on 20 and 31.vii. This is a rare and local bee, but is very widely distributed in the British Isles,

ranging from Kent to west Cornwall, northwards to Gloucestershire, Northamptonshire and Norfolk; it is known too from Wales, central Scotland and southern Eire (Else, in prep.). The species is mainly associated with scabious flowers: small scabious, devil's-bit scabious (*Succisa pratensis* Moench) and field scabious. The flight period in the British Isles of this single-brooded species is from mid July to late September.

A. nitidiuscula (Schck). This is a very local bee in Britain, known from East Sussex to east Devon (and including the Isle of Wight), Surrey and Berkshire (Else, in prep.). It has been mainly found on the coast, but is also known from heathland and open, broad-leaved woodland. The bee is associated with the flowers of various species of Apiaceae. The first Wiltshire record was a female found by S. P. M. R. near Tilshead on 19.viii.1991. In July and early August, 1993, a thriving nesting aggregation of this bee was observed by us on an exposed track on Figheldean Down. Females foraged nearby on wild carrot blossom; some males visited yellow Asteraceae flowers. A pair was found in copula on the ground within the nesting area on 7.viii. In Britain the species is single-brooded and is active from the end of June to early September.

Interestingly, many *Nomada rufipes* F. were observed in the vicinity of this nesting aggregation, but not elsewhere on the Down. It seems possible that this *Nomada* is a cleptoparasite of *A. nitidiuscula* in this site. This association has not previously been suspected. The nationally endangered *N. errans* Lepeletier is a known cleptoparasite of *A. nitidiuscula* in Britain (though the former is only known in this country from a single site on the Isle of Purbeck, Dorset). *N. rufipes* is considered to be a cleptoparasite of certain species in the *Andrena fuscipes* (Kirby) group, to which *A. nitidiuscula* does not belong. On heaths and moors it attacks *A. fuscipes* (Evans, 1906; Frisby, 1906), but elsewhere it seems to be associated with *A. denticulata* (Kirby) (Perkins, 1918, 1919; Chambers, 1949; Spooner, pers. comm.) and *A. nigriceps* (Kirby) (Swale, 1893; Jones, 1928; Chambers, 1949). None of these *Andrena* species has been recorded on Figheldean Down. However, *A. simillima* Smith, F., a close relative of *A. nigriceps*, does occur in this site in small numbers.

A. simillima Smith, F. This is another very scarce bee with a restricted range in Britain. It has mainly been found in east Kent (Folkestone Warren), south-east Devon and Cornwall. In addition there are old, unconfirmed records from the Isle of Wight, Suffolk and Norfolk (Else, in prep.). Inland sites are very unusual; the only ones known to us, prior to our survey, were in Dorset (Morden, 1928) and Hampshire (Abbotstone Down, near Alresford, 1985). The bee is mainly associated with flowers of Asteraceae, including thistles, knapweeds, scentless mayweed and common ragwort (*Senecio jacobaea* L.). S. P. M. R. found a male *A. simillima* on Figheldean Down on 11.vii.1993, followed by further single records of females on 14 and 22.vii, and 1.viii. Finally, G. R. E. found two females in the same site on 7.viii; one was visiting a flower of greater knapweed, the other scentless mayweed. Nationally, the bee flies as a single brood from early July to August.

Melitta dimidiata Mor. (Melittinae). This, the largest of the four British *Melitta* species, was first found in Britain near Tilshead by P. W. E. Currie on 9.vii.1949 (Baker, 1965). According to D. B. Baker (pers. comm.) the site was close to White Barrow, a neolithic long-barrow on Tilshead Down to the south of the village. Baker has also encountered the species on the barrow and, on numerous visits from 1964 to 1989, found the bee on the adjacent grassland and at Yarrow's site (see below). In the 1970s the custodians of White Barrow, The National Trust, attempted to control scrub invasion on the ancient monument by erecting a fence around it and introducing a flock of sheep. The sheep succeeded in eradicating both scrub and sainfoin, the latter being the sole pollen source of this bee!

On 10.vii.1965, I. H. H . Yarrow discovered the species in a second site on Salisbury Plain (Yarrow, 1968). Shortly before he emigrated to Australia in the 1980s, he disclosed to G. R. E. that the site was a neolithic barrow south-west of Tilshead (near Horse Down, north of the Chitterne road), not far from Currie's site.

In 1991 we rediscovered the bee near White Barrow on 16.vii, and on the following day at both Yarrow's site and West Down (east of and overlooking the army camp). In addition we also encountered it in two new sites: about a kilometre north of Tilshead and on the roadside about a kilometre east of West Down. It was particularly common at West Down, but only occurred in small numbers in the other sites visited. S. R. Miles (pers. comm.) found the bee at West Down in both July 1986 and July 1991.

In the following year we again found it on several dates in late June and July to the north of Tilshead and at West Down. Seven females and at least 36 males were seen by us on West Down on 27.vi, and both sexes plentifully on 28.vi by S. P. M. R. (from the roadside, south across the army range towards the main Tilshead to Shrewton road).

A further three sites for the species were found in 1993: Great Cheverell Hill (1.vii and on subsequent visits in the same month); Figheldean Down (in late June by D. Sheppard, and later by the authors on 11.vii and on a few visits thereafter). R. Gabriel encountered several males at a site 1 kilometre north-west of Tilshead on the West Lavington Road (east of Horse Down) on 16.vii.

The bee is protandrous, the males emerging ahead of the females. The former begin flying in late June and continue well into July. When freshly emerged, males are clothed over much of their bodies with rich, reddish brown hairs, but this colour rapidly fades to whitish, when specimens appear silvery on the wing.

Males fly rapidly between the sainfoin plants, only pausing occasionally for brief visits to the flowers. During cool, cloudy conditions this sex has been observed sheltering within the racemes of sainfoin and in the flowers of clustered bellflower (*Campanula glomerata* L.), field scabious and oxeye daisy. Females are generally active from late June to mid August (in 1993 an apparently freshly emerged specimen was found on 31.vii). In common with the other three species of British *Melitta*, they are not as frequently seen in the field as males. The females excavate their nesting burrows in the soil, but no nests of this bee have been found in Britain.

In Britain both sexes are known to forage only from the flowers of sainfoin. Thus *M. dimidiata* is entirely restricted to sites where there is sufficient sainfoin to maintain these populations. This plant is very widely distributed over the semi-natural grasslands of Salisbury Plain, with significant populations in many sites. Indeed, as a single unit, the Plain probably has the most extensive populations of this plant in the country.

Two forms of sainfoin occur in southern England, one native, the other introduced. The native one (ssp. *montana* Hegi) is characterized by deep pink flowers and fewer leaves, and is semi-procumbent to erect in form (Hegi, 1924; Dony 1953; Grose, 1957). There are late glacial British pollen records of sainfoin (Godwin, 1975), and it is presumed that *M. dimidiata* subsequently arrived in Britain in boreal or sub-boreal times (Baker, 1965). In addition, there are records of sainfoin in the writings of Gerarde (1597), Goodyer (c. 1634), Martyn (1792) and Britton (1801–25). Gerarde noted it in areas which today support strong populations of ssp. *montana*.

During the seventeenth century, another variant (ssp. *sativa* Hegi) was introduced as a fodder plant (Aubrey, 1685). This taxon differs from the native form in being taller, more erect, and the stems bearing paler flowers and more leaves, with broader leaflets, than its relative (Hegi, 1924). This introduction is now found as a relic

of former cultivation and it has been found in some localities on Salisbury Plain. It also seems to flower earlier in the season; for example, in late May 1990, it was in full flower in a site in east Dorset, yet the semi-procumbent form flowered about a month later on Salisbury Plain.

The difference in flowering periods of the two forms would largely restrict *M. dimidiata* to the native one. However, in sites where the grassland is mown for hay, plants of the introduced form of *O. viciifolia* flower again at a time when the bee can benefit from these additional flowers, although such a late flowering of this form is not as prolific as earlier in the season.

Apparent intermediates between the two strains (which appear in some localities on the Plain) are probably of hybrid stock. At least one farming family (Home Farm, near Cholderton, south of Bulford) has been growing the introduced variant as a seed and fodder crop for about a hundred years (A. Summers, pers. comm.) (sainfoin was mainly used as hay for horses, but the market for this has largely gone and very few farms currently grow the plant). Several commercial varieties of sainfoin have been developed for use on particular soil types.

Nomada argentata H.-S. (Anthophorinae). This is a rare but widely distributed species in southern England. It has been reported from Kent to east Cornwall, Somerset, Oxfordshire, Berkshire, Surrey, Bedfordshire and Cambridgeshire and has also been found in Eire (Carlow and Leix) (Else, in prep.). In Wiltshire it is currently known only from Figheldean Down, where it was found on 22.vii, 1 and 7.viii.1993. This species, in common with its host *Andrena marginata*, is extremely local in this site. Although a few specimens of the cleptoparasite were encountered visiting the flowers of small scabious, most (including both sexes) were observed flying low over the bare soil of tracks, the females presumably in search of the nests of *A. marginata*. Some *N. argentata* are very dark and can easily be passed over as small species of other aculeate genera. In the British Isles the species flies from mid July to mid September.

N. armata H.-S. This is a very rare cleptoparasite of the mining bee *Andrena hattorfiana*. Nationally, this *Nomada* species has been reported from Kent, the Isle of Wight, Dorset, Devon, Cornwall, Wiltshire, Oxfordshire, Surrey, Essex, Norfolk and West Glamorgan (Else, in prep.). It was first recorded in Wiltshire in July 1991 when we found a pair (male on 17th and female on the 21st) near Tilshead. We did not encounter it in 1992, but in the following year it was noted by us in the following sites: to the north of Tilshead, 27.vi. and on a few subsequent dates; Great Cheverell Hill, 1, 4 and 7.vii; Bulford, 4 and 7.vii; Figheldean Down, 15.vii; and Weather Hill, 20.vii. The Weather Hill specimen was visiting a flower of small scabious; all the others visiting flowers were at field scabious. A specimen was also seen on the east side of the West Lavington road (opposite Horse Down), 1 kilometre north-west of Tilshead, on 16.vii.1993 by R. Gabriel. A total of 35 individuals was encountered in 1993. The most recent British records are from east Dorset (1945 and 1949), Oxfordshire (1968) and Norfolk (1977). The majority of records refer to very small numbers of specimens. An exception was a record of many flying with their host *Andrena* at Tubney, near Oxford in July, 1900 (Hamm, 1901). Both host and parasite are usually encountered on the flowers of field scabious, less commonly on those of small scabious or unrelated plants. Some females, however, found by us, were flying low over occupied nesting burrows of the host *Andrena*. Salisbury Plain is undoubtedly the most important locality in Britain for *N. armata*. Nationally, the flight period extends from late June to the end of July.

Bombus ruderatus (F.) (Apinae). More than half the number (ten of seventeen) of native species of British bumblebees (excluding the six species of cuckoo

bumblebees—*Psithyrus* species) have been found on Salisbury Plain. Of these ten, *B. humilis* Ill., *B. lapidarius* (L.), *B. ruderarius* (Müller) and *B. sylvarum* (L.) are associated mainly with dry, calcareous grassland in southern England. An abraded queen of *B. ruderatus* was found just north of Tilshead on 27.vi.1992 by G. R. E. (the only specimen he has encountered anywhere in the past 24 years).

B. ruderatus was formerly a common and widely distributed species in Britain, the range extending from Kent to Cornwall, northwards to Northumberland (Else, in prep.); in Wales there is an old record from southern Gwynedd (see map in Anon., 1980). Sladen (1912) mentions that the species occurs in Scotland, and also cites a single Irish record. These old records cannot be confirmed and may be based on misidentifications. There can be no doubt that this bumblebee has declined dramatically this century. To Sladen it was a very common bee in England (his 'Large Garden Humble-bee'), but today it is rarely encountered, most other recent records originating from east Kent (P. Williams, pers. comm.) and East Anglia (S. Falk, pers. comm.). Even in these localities the species is very scarce. The British flight period of the species is from mid April to mid October.

B. sylvarum (L.). Although formerly widespread in southern Britain, the range of this bumblebee has diminished greatly in recent years. It has been recorded from Kent to Cornwall, northwards to Gwynedd, southern Cumbria and Northumberland (Anon., 1980). It is a rare and sporadic bee in Ireland, with only a single confirmed Scottish record. It occurs in various biotopes, but especially in chalk grassland. On Salisbury Plain it was found near White Barrow, in July 1983 and June 1984; and north of Tilshead in July 1991 and June 1992. R. Gabriel found the species on the east side of the West Lavington road (opposite Horse Down), 1 kilometre to the north-west of Tilshead, on 16.vii.1993. The national flight period is from mid May to September.

Psithyrus rupestris (F.). Formerly this cuckoo bumblebee was found throughout much of the British Isles, except for the far north of Scotland, the Scottish Islands and the Isle of Man (Else, in prep.). During this century the species' range has contracted dramatically, so that currently the bee is largely restricted to sites in southern England and Wales, and coastal Eire (Anon., 1980). Even in these areas the bee is very sporadic. The reason for the decline is unknown. The species is a social parasite of *Bombus lapidarius*, a bumblebee which remains common and widespread throughout much of the British Isles. In the past Sladen (1912) estimated that in east Kent females of *P. rupestris* usurped 20–40% of *B. lapidarius* nests. Nationally, this cuckoo bumblebee flies from late May to late September.

In recent years this species has been found in several sites on Salisbury Plain: Parsonage Down, near Winterbourne Stoke, a male, 17.vii.1982; Great Cheverell Hill, many females, 6 and 20.vi, one female 4.vii, and several males 21.viii.1993; Bulford, female, 6.vi.1993; near Tilshead, several females, 27.vi (unusually one had a bright yellow pronotal hair band) and 1.vii.1993, and a male 21.viii.1993.

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